Illicit Narcotics Cultivation and Processing: The Ignored Environmental Drama

THE UNITED NATIONS INTERNATIONAL DRUG CONTROL PROGRAMME

Drug abuse and the environment are among the most preoccupying issues in today's world. The international community is addressing both of them at many levels and with varying degrees of success. Notable in the drug control field was the coming into existence in 1991 of the United Nations International Drug Control Programme, created by the General Assembly to lead, coordinate and strengthen the United Nations system's work in drug control.

On the environment question, the 1992 United Nations Conference on Environment and Development is expected to add momentum and urgency to the worldwide efforts to protect the Earth's vital resources.

Up to now, relatively little attention has been given to linkages between these two issues, which are at first glance unconnected in any meaningful way. More careful analysis identifies major linkages in connection with the environmental impact of illicit drug cultivation, the rapid expansion of illicit cultivation into tropical forest areas, the efforts to eradicate illicit crops and the pollution through the processing of raw materials into drugs of abuse.

This brochure presents these linkages and sets out some measures which might be taken in consequence.

Note: The text of this brochure will constitute the main article in the forthcoming issue of the *Bulletin on Narcotics*.

Cultivation of illicit narcotic crops accounts for an increasing share of tropical deforestation (Chapare, Bolivia).

Each year, despite greater international awareness and conservation efforts, more than 11 million hectares of the Earth's remaining tropical forests are cleared and converted to other land uses or unproductive land.* Studies show that if current trends continue, the present forest reserves will be consumed in less than 40 years. Considering the fact that more than 75 countries between the tropics of Cancer and Capricorn have control of virtually 100 per cent of the world's tropical forest area, compared with only six or seven countries dominating the temperate woodlands, there is a need for a coordinated worldwide effort to focus increased attention on conservation and restoration of these tropical resources.

Numerous scientific studies conducted to date describe the negative consequences associated with the loss of the world's tropical forest resources. Categorically, these consequences consist of *land* concerns, such as soil erosion and soil nutrient depletion; *genetic* concerns including the loss and extinction of entire species of both flora and fauna—which by some estimates represent a rich genetic pool where hundreds if not thousands of species whose benefits to man are yet undiscovered; *hydrological* concerns, which include the loss of watershed and the sedimentation or siltation of waterways leading to lowland flooding, the loss of agricultural land, and even further ecological imbalance; *socio-economic* concerns, such as increased hunger, poverty, reduced standards of living and the rapid loss of untold medicinal and pharmaceutical benefits to mankind from the world's forest resources; and finally *atmospheric* concerns, including the impact upon regional climates and a greater likelihood of both drought and flooding.

Experts attribute deforestation and water pollution in the tropics to population pressures, shifting cultivation patterns, and the extraction of economic resources. Typically, rain forests are cleared to permit the creation of new roads, farmlands and ranchlands; the construction of dams and large-scale hydrological projects; mining and smelting operations; the gathering of fuel wood; and logging for domestic and export purposes. One significant contributor to the forest removal, water and soil pollution in these regions, however, whose impact has gone virtually unnoticed by scientists and journalists, has been the cultivation of illicit narcotics crops—cannabis, coca and opium poppy.

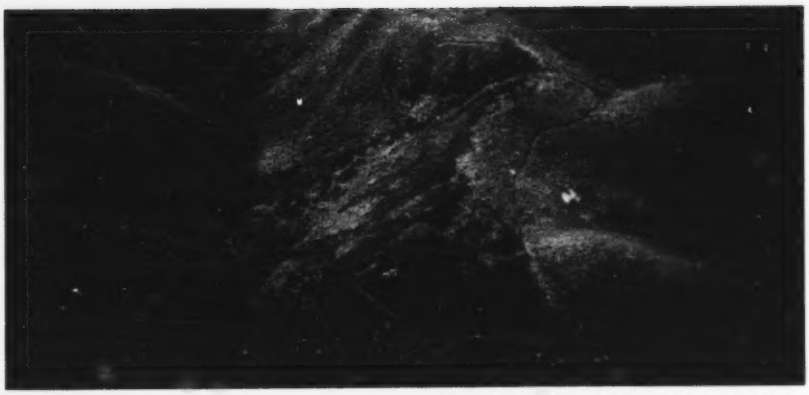
Cultivation of illicit narcotics not only accounts for an increasing share of tropical deforestation, it is also the cause of some of the most severe environmental damage. Growers commonly plant their illicit crops in fragile forest environments in remote areas. Moreover, in some areas the illicit cultivators are often recent migrants from urban centres or other economic pursuits who have moved into the growing regions to take advantage of quick profits. Unlike an indigenous peasant farmer who often has a culturally instilled sense of respect for his land and the environment, narcotics cultivators often have no emotional ties to either farming or the land. Thus, the clearing and cultivation methods of these "opportunistic" illicit drug growers are usually more devastating than those of a true agrarian.

The more severe environmental degradation to tropical forests by illicit narcotics cultivators largely results from

*This amounts to an area of 1-2 per cent of the world's tropical forests being cleared every year, an area the size of Great Britain

the rapid and damaging techniques used to clear the land. Even today, the most widely used forest removal method is manual clearing, commonly known as "slash-and-burn" agriculture, where trees are rapidly felled and destroyed by fire, leaving no vegetative matter to stabilize or replenish the soils. Frequently, fields are utilized for only a few years until the initial nutrient sources are depleted. The effects are further exacerbated when the narcotics crops are cultivated on steep-sloped fragile mountain environments where soil is thin and the potential for a nigh degree of soil erosion is great. Other land clearing techniques, including both the use of petrol and diesel-fuelled machinery, destabilize the soils and accelerate the rates of soil loss.

Chemicals used by many growers at all stages of illicit drug cultivation and production likewise have a substantial negative impact upon tropical ecosystems and on human population. Growers of illicit crops, in order to clear and maintain their fields, frequently use high levels of fertilizers, herbicides and pesticides. Each year cocaine and heroin processors dump indiscriminately millions of tons of toxic chemical substances and waste by-products of the extraction process onto the land and into countless small streams, rivers and water bodies. These hazardous chemical wastes have a perilous impact on land as well as water life forms. Ecological experts note that many of the affected tributaries are now almost entirely devoid of many species of plant and animal life. Contaminated water used to irrigate food crops not only compounds the environmental damage but poses a substantial public health hazard.



The more severe environmental damage to tropical forests by the cultivation of illicit drug-producing plants largely results from the harmful techniques used to clear the land (Lao People's Democratic Republic).

Illicit coca cultivation and processing

Virtually all of the illicit cocaine produced comes from the Andean regions of three South American countries—Peru, Bolivia and Colombia. More specifically, most of the coca leaf used to produce cocaine is grown either in the Upper Huallaga Valley in Peru or the Chapare region in Bolivia. The dramatic expansion of coca cultivation and cocaine processing, largely during the past decade, has caused and is continuing to cause environmental damage, the extent of which may never be fully assessed. Systematic removal of mountain and lowland jungle forests for coca cultivation and the construction of illicit airstrips, and the chemical pollution of countless waterways is inflicting irreparable harm upon widespread areas of the Amazon jungle habitat. Although most coca is grown in forests protected by law, the Governments of Peru, Bolivia and Colombia have had considerable difficulty in slowing the rate of deforestation, and as a result the destruction of some of the most important ecosystems in the upper Amazon basin.

Peru, the world's leading cultivator of illicit coca, is the most important supplier of coca paste and cocaine base to cocaine hydrochloride laboratories in Colombia. Today, Peru's estimated country-wide coca cultivation is at least 125,000 hectares, significantly more than the amount cultivated by the other two leading coca producing countries, Bolivia and Colombia. While coca is grown in nearly every administrative department in Peru, almost 65 per cent of its cultivation is concentrated in the Upper Huallaga Valley, a remote jungle region on the eastern slopes of the Andes near Tingo Maria, some 300 kilometres north-east of Lima.

In the past decade, the economy of Peru's Huallaga region has been transformed from a largely self-sufficient mixed agricultural economy into one of predominate illicit coca cultivation. The intensification of coca cultivation in the Huallaga floodplain and adjacent low hills as well as vigorous expansion into highland forest environments is responsible for the annihilation of nearly 1 million hectares of tropical forest resources. A heavy smoke haze covers the Upper Huallaga Valley in August and September as growers using centuries old slash-and-burn techniques, methodically remove primitive jungle forests for new illicit coca fields.

Cultivators of illicit coca fields—in their relentless pursuit of fertile growing soils—have recklessly exposed the thin tropical forest soils to increased runoff and erosion. Evidence of the excessive deforestation became painfully apparent during devastating November 1987 floods in central Peru. Torrential rains caused major landslides, blocked roads, and impoverished and killed scores of lowland residents. Post-flood inspection of the Huallaga watershed revealed extensive new sedimentation along rivers and streams throughout the region. The Lima press, calling the deluge "the worst flooding in Peru's history", attributed the damage to "indiscriminate upland deforestation".

Equally tragic, the Huallaga region's coca cultivators are rapidly eliminating one of the most genetically prosperous ecosystems of the entire Amazon river basin. The United States National Academy of Sciences reports that as many as 300 tree species can be counted in a typical hectare of Peruvian rain forest, in contrast with only 7 to 15 per hectare in an average temperate forest. By comparison, South-east Asian forests average no more than 200 tree species per hectare while those in Central Africa peak at 120 species, thus making the Peruvian Amazon one of the world's more diverse repositories of tree species. Moreover, the vast destruction of Amazonian forests for coca cultivation contributes to the loss of rare plant species from which future pharmaceutical drugs and other human benefits may be developed.

The Huallaga region of Peru may also be the world's richest in all forms of fauna with documented record numbers of species among butterflies, amphibians, reptiles, birds and mammals, representing a combined latent genetic potential virtually impossible to quantify. However, leading scientists note that if current rates of deforestation in Peru persist, this "genetic frontier" may soon be gone. According to the Global 2000 Report to the President of the United States, "extinctions of plant and animal species will increase dramatically. Hundreds of thousands of species—perhaps as many as 20 per cent of all species on Earth—will be irretrievably lost as their habitats vanish, especially in the tropical forests."

Coca cultivation in Bolivia, South America's second largest producer, is located in the Yungas region, where impressive hillside terracing for coca growing and the chewing of its leaves precede colonial times, and in the more recently developed Chapare region. The Chapare, a semi-tropical area—

about the size of El Salvador—located approximately 600 kilometres east of the capital city of La Paz, accounts for the majority of Bolivia's illicit cultivation for cocaine production. For many years the Chapare's farmers, who were all immigrants from other regions of the country, successfully produced a variety of food crops including rice, yucca, citrus and bananas. In the past two decades, however, as the international demand for illicit coca escalated, the region rapidly shifted from mixed coca and legitimate crops to coca-dominated agriculture. Today, the Chapare's extensive switch to coca cultivation now requires the region to import food in order to support its population.

The environmental losses associated with the Chapare's shift to coca cultivation are enormous. Coca growers, more so than legitimate farmers or livestock ranchers, are annually razing thousands of hectares of forests from the alluvial plains and nearby foothills. Ecologists estimate that more than 15,000 hectares of forests in the Isibora Secore (National Park), on the border of Cochabamba and El Beni departments, have been replaced by coca plantations. Most recently, indifferent coca cultivators have methodically begun destroying the higher hillside forests above the Chapare's jungle plain. In these elevated areas, little or no timber is saved and there is no evidence of forest conservation or reforestation. The destructive slash-and-burn agriculture has changed river flows, stripping off top soils and exposing the underlying sand soils.

Coca planting in the lowland Chapare region as well as the elaborately terraced Yungas and other similar Andean growing regions in Peru and Colombia, while not always causing major soil erosion, nevertheless contribute to permanent soil ruin. For example, the wholesale removal of the natural vegetation combined with the negative growth characteristics of the coca bush itself have depleted the basic soil nutrients—nitrogen, carbon and essential minerals—leaving behind highly infertile soils. In addition, the nitrogen and phosphorous residues from powerful herbicides, pesticides and fertilizers used by coca growers magnify the soil sterility. As the lateritic soils harden following the removal of coca bushes, they become extremely hostile to the subsequent growth of other plants. Therefore, even if government officials in the Chapare, Yungas, or any other growing regions, are successful in reducing or eliminating coca, the possibility of planting alternative crops or effective reforestation on the same lands will be woefully lessened.

Experts estimate that hundreds of thousands of metric tons of chemicals are used annually in cocaine production in the Andean region, roughly representing about two metric tons of waste by-products generated for each hectare of illicit coca cultivation. In the process of maceration and washing coca leaf to make coca paste, processors indiscriminately discard enormous amounts of gasoline, kerosene, sulphuric acid, ammonia, sodium carbonate, potassium carbonate and lime onto the ground and into nearby waterways. Buenaventura Marcelo of Peru's National Agrarian University, who has studied the toxic effects of chemicals used in coca paste production, writes: ". . . the rivers and streams of the middle and higher elevations of the Upper Huallaga Valley . . . are literally flooded, year after year, with vast quantities of toxic waste and pollution". Dr. Marc Durojeanni, a former head of the same Peruvian

university, writes: "fisheries and all forms of life are almost totally destroyed in the small streams". Similarly, in the Chapare region of Bolivia and the Llanos region of south-east Colombia, millions of litres of used toxic chemicals are irresponsibly discarded onto the soil and into nearby streams. Recently, paste processors have even found it convenient to hide laboratories in remote natural areas such as Isiboro-Secure National Park, one of the Chapare's most primitive forest reserves.

Colombia, the Andean region's primary processor of cocaine base and cocaine hydrochloride, has incurred immeasurable damage to the Llanos region ecosystem from the dumping of chemical wastes generated in the processing. Each year, more than 20 million litres of ethyl ether, acetone, ammonia, sulphuric acid and hydrochloric acid—primary chemicals used to produce cocaine hydrochloride—are discarded from jungle laboratories into the nearby streams and tributaries that feed the vast Amazon and Orinoco rivers. Affected Llanos waterways, such as those in the coca processing regions of Peru and Bolivia, are almost entirely devoid of many species of aquatic plant and animal life.

Illicit opium poppy cultivation and heroin refining

Environmental degradation—removal of rain forests, loss of soils and their nutrients, watershed pollution, and loss of species diversity—by illicit opium poppy cultivators and heroin producers in many respects is analogous to that inflicted upon their environment by illicit coca cultivators and processors in South America. In South-east Asia, hill tribe farmers and other opium poppy growers—sometimes not fully under the control of central Governments—have razed hundreds of thousands, if not millions, of hectares of mountain rain forests to support the shifting nature of their agricultural system. Likewise, heroin processors have carelessly discarded unknown quantities of toxic chemical wastes and by-products into the region's rivers, streams and reservoirs.

Until recently, the mountains and valleys of the Golden Triangle region of Lao, Myanmar and Thailand provided almost limitless geographic territory for opium poppy cultivators. The mostly primitive forest region, consisting of almost 400,000 square kilometres of mountainous terrain, was sparsely populated by what appeared to be nomadic

tribes. Unfortunately, the opium poppy plant, like much of upland agriculture, often depletes the thin forest soils and their nutrients so quickly that slash-and-burn growers, after harvesting as few as two or three crop cycles, clear new forest plots. The cumulative result of the removal of forest resources by these migratory agricultural practices has rapidly compounded the environmental destruction of the Golden Triangle region.

Heroin production is a multi-step process consisting of the removal of latex or gum from the green opium poppy capsule, the extraction of morphine from latex, and the conversion of the morphine into heroin. The first step, harvesting of the opium gum by the peasant farmer, quite unlike the concluding two steps, is not harmful to the environment. Secondly, morphine extraction, performed in very rudimentary shelters beneath jungle canopy, requires a number of natural chemicals similar to those used for cocaine hydrochloride production. The process uses a variety of solvents, acids and alkalis including lime and ammonia, tartaric acid and ammonium chloride, as well as alcohol and acetone. Finally, the conversion of morphine into heroin—a chemical reaction called acetylation—requires somewhat more advanced laboratory conditions. Primary chemicals employed in heroin refining are acetic anhydride or other acetylating agents, solvents and hydrochloric acid, and ammonia or other alkalis.

Heroin refining, done in relatively simple jungle conditions analogous to cocaine processing, likewise has devastating effects upon tropical ecosystems. Whereas in earlier decades the production steps of heroin processing were separated geographically (the opium harvesting and morphine extraction being conducted near cultivation versus the heroin processing near chemical sources in Europe and elsewhere), today's entire production chain takes place in the growing area. Consequently, highly dangerous chemical substances such as acetylating agents as well as dozens of other waste by-products—highly toxic to animal and plant life—are commonly discarded or seep into nearby waterways. Similarly, heroin refiners at clandestine jungle refineries located near international borders carelessly contaminate regional water resources by their indifferent disposal of poisonous processing chemicals.

Favourable topography, the key geographic factor responsible for the creation of the opium economy in South-east Asia, is one of the best arguments for eliminating opium poppy cultivation. Increasing population pressures combined with diminishing forest resources and associated detrimental effects such as watershed loss and downstream sedimentation are raising environmental issues to new levels of visibility in all South-east Asian countries where the opium poppy is grown. The International Union for Conservation of Nature Commission on Parks and Protected Areas (ICUN) recently added Chiang Mai's Doi Inthanon National Park to its list of threatened parks. Its forest reserves, along with Doi Chang Das Wildlife Sanctuary in Chiang Mai Province, have been severely damaged by opium poppy cultivation and other human encroachment.

Recently, the Lao Government, estimating that its forests are being depleted at a rate of 250,000 to 350,000 hectares per year, initiated an intensive programme to replace slash-and-burn agriculture with more stable (and licit) agriculture. The objectives of all programmes are to preserve the forest environment and offer opium poppy farmers a viable alternative means of livelihood. Officials realize that the eradication of existing fields, without a viable economic alternative, will likely cause some farmers to burn new forest areas in order to continue opium poppy farming.

Elsewhere, Mexico's largest remaining tropical forest region, located in the south-east Chiapas state, is one of the more recent victims of the heroin trade. Opium poppy cultivators, here as well as in nearby Guatemala's San Marcos department and in Colombia's Huila and Tolima departments, are indiscriminately removing thousands of hectares of high mountain forests at elevations between 2,000 and 3,000 metres. Growers are commonly planting their crops on extremely fragile, well-watered, steep-sloped narrow mountain canyons and in small isolated stream valleys, in order to limit their visibility. The recent shift of opium poppy cultivation to these new regions in Latin America is believed to be the result of successful government law enforcement and eradication programmes in the traditional growing regions of Mexico's northern states—Sinaloa, Durango and Chihuahua—among others.

Illicit cannabis cultivation

Cannabis cultivation and processing, unlike cocaine or heroin processing, generally do not include the use of toxic chemicals. Nevertheless, the impact of its cultivation upon forest environments in a number of countries has been no less profound. Growers of cannabis also plant their illicit crops on isolated mountain slopes, disturbing fragile forest soils. Evidence of the tragic environmental consequences of rampant cannabis cultivation is particularly apparent in Colombia and Jamaica.

Colombia, until recently, was a major producer of illicit cannabis. Most of it was grown on the fertile slopes of the Sierra Nevada de Santa Marta and the Serrania de Perija mountains in northeast Colombia. The Santa Martas, which rise abruptly from the Caribbean to 6,000 metres in just 50 kilometres, have very steeply sloping, sharp-crested ridges that radiate outward from the central part of the mountain mass. The Perija range along the Venezuelan border to the east, although lower, has a similar topography. Initially, cannabis was planted in large fields carved out of these mountain forest canyons at elevations from 1,000-2,000 metres. However, with the start of more effective law

enforcement by Colombian authorities in the mid-1980s, growers moved to smaller plots located in much higher and more isolated mountain slopes and canyon forests to plant their illicit crops.

There is no accurate assessment of the environmental aftermath of the excessive mountain deforestation by illicit cannabis growers in northern Colombia. Descriptive accounts by leading government and private organizations including the National Police, the geological institute, environmental agencies and the Bogotá press, cannot begin to depict the extensive and permanent nature of damage to these mountain environments by irresponsible narcotics organizations. Likely to be forever forfeited are the valuable forest resources and watershed, portions of national park reserves, and even indigenous lands. There are countless incidents of denuded mountain slopes and rock outcrops resulting from massive landslides and erosion. Related economic losses include the annihilation of large areas of the north coast shellfish industry, destroyed by heavy siltation from upland soil runoff, and productive lowland agriculture, a victim of increased flooding and sedimentation.

Entrepreneurial Jamaican cannabis cultivators operate with an almost total disregard for the island's fragile tropical environment. Growers clearcut and destroy hilltop and steep-sloped hillside forests, exposing marginally fertile soils to rapid runoff and erosion. Additionally, after planting and harvesting as few as two or three crops, they abandon fields in favour of new forest soils. Inspection of Jamaica's cannabis regions reveals that the most permanently damaged forest environments are those of karst topography where thin limestone soils have left bare rock incapable of sustaining secondary growth. Moreover, damage from May-June 1986 flooding in the central and western parishes, described as some of the worst in the island's history, was largely attributed to unchecked upland deforestation. Former Prime Minister Seaga, in a nationally televised address, warned that continued downstream sedimentation from upland deforestation and soil erosion will have increasingly adverse effects upon the animal and plant life of the island's mangroves and coastal reefs.

Suggestions for international action

UNDCP believes that farmers should be better informed and educated about what they are doing to their land and their future if they engage in the cultivation of illicit crops.

Scientists have repeatedly warned of the dire consequences of tropical deforestation, and humanity can ill afford the increase in soil erosion and fertility, the destruction of forests and watershed and the loss of genetic diversity. It is unconscionable that the illicit cultivation and processing of crops used to produce certain drugs contributes significantly to this environmental damage. The international community needs to understand this linkage and take it into account in adopting both its drug control strategies and its environment strategies.

Vital to the effort in this respect is the need for full awareness of the facts by both leaders and the general public. This can be facilitated by greater media attention. In addition, the scientific and academic communities can greatly contribute by monitoring the environment/drugs connection and by undertaking more research and assessment in the field.

UNDCP projects already take the environmental issue seriously when plans are made for alternative development of traditional growing areas. Yet more can be done. The already damaged areas can be singled out to the

relevant national and international institutions as priority areas for reforestation and rehabilitation.

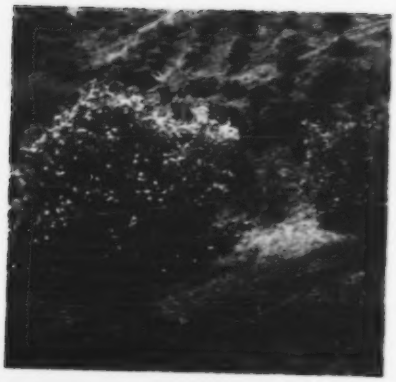
Farmers themselves can be better informed and educated about what they are doing to their land and their future if they engage in quick-cash illicit crops.

International financial institutions should be encouraged to join in the effort, since the damage is not limited to traditional areas where UNDCP sponsors development-oriented activities but in areas where cultivation has only recently been introduced in full knowledge of its illegality. It is only with resources at the level of those available through the major international financial institutions that broader developmental issues can be addressed, taking into account both the environmental and the drug issues, as well as the linkages between them.

Those agencies working in one way or another to reduce the supply of illicit drugs can add to their arsenal of arguments the fact that they are working to protect the environment in tropical forest areas.

Taking this position one step further, the actual and potential users of illicit narcotics should be made to understand that they are not only damaging their own futures but that they are contributing to the destruction of the tropical forests. As the high-risk age groups for drug abuse are often the same age groups that have high levels of sensitivity to the environment issue, such a linkage should prove very effective, as it has with regard to other products.

The general public should be made aware of the linkage between drugs and the environment.



UNDCP alternative development projects in illicit coca and opium-producing areas feature the improvement of agricultural practices and the introduction of alternative crops.

Some encouraging steps are already being taken. More and more environmentally safe methods of crop destruction are being developed. Greater support for the crop replacement actions through the UNDCP has permitted the planning of more comprehensive plans for areas of traditional cultivation, thus permitting a widening of the approach to include greater attention to environmental issues. On the political side, the 1988 Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances requires parties to protect the environment when taking measures to prevent or eradicate illicit cultivation. The General Assembly at its seventeenth special session, devoted to the drug issue, incorporated an environmental caution in its Global Programme of Action. It furthermore called upon the United Nations Environment Programme to study and assess the question.

These measures only set the stage for the necessary action. The international community, which only recently created UNDCP to serve as the basis for a cohesive international action against drug trafficking and abuse, has also turned its attention to the need for more intensive action to protect the environment. By combining forces to address the situations described in the preceding pages, there is a clear opportunity to strengthen the action on both issues.

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Not an official document—for information only

Printed in Austria
V.92-54228—May 1992—2,000
V.93-81862—March 1993—1,500
V.93-88103—August 1993—2,000